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1 [Support vector machines: hype or hallelujah?](#)


 Kristin P. Bennett, Colin Campbell
 December 2000 **ACM SIGKDD Explorations Newsletter**, Volume 2 Issue 2

Publisher: ACM Press

 Full text available: [pdf\(1.26 MB\)](#)

 Additional Information: [full citation](#), [citations](#), [index terms](#)
Keywords: Support Vector Machines, kernel methods, statistical learning theory

2 [Research track paper: Rule extraction from linear support vector machines](#)


 Glenn Fung, Sathyakama Sandilya, R. Bharat Rao
 August 2005 **Proceeding of the eleventh ACM SIGKDD international conference on Knowledge discovery in data mining KDD '05**

Publisher: ACM Press

 Full text available: [pdf\(244.15 KB\)](#)

 Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

We describe an algorithm for converting linear support vector machines and any other arbitrary hyperplane-based linear classifiers into a set of non-overlapping rules that, unlike the original classifier, can be easily interpreted by humans. Each iteration of the rule extraction algorithm is formulated as a constrained optimization problem that is computationally inexpensive to solve. We discuss various properties of the algorithm and provide proof of convergence for two different optimization c ...

Keywords: linear classifiers, mathematical programming, medical decision-support, rule extraction

3 [Core Vector Machines: Fast SVM Training on Very Large Data Sets](#)

 Ivor W. Tsang, James T. Kwok, Pak-Ming Cheung
 April 2005 **The Journal of Machine Learning Research**, Volume 6

Publisher: MIT Press

 Full text available: [pdf\(468.46 KB\)](#)

 Additional Information: [full citation](#), [abstract](#)

Standard SVM training has $O(m^3)$ time and $O(m^2)$ space complexities, where m is the training set size. It is thus computationally infeasible on very large data sets. By observing that practical SVM implementations only *approximate* the optimal solution by an iterative strategy, we scale up kernel methods by exploiting such "approximateness" in this paper. We first show that many kernel methods can be equivalently formulated as minimum ...

4 [A Modified Finite Newton Method for Fast Solution of Large Scale Linear SVMs](#)

 S. Sathiya Keerthi, Dennis DeCoste
 April 2005 **The Journal of Machine Learning Research**, Volume 6

Publisher: MIT Press

 Full text available: [pdf\(195.71 KB\)](#)

 Additional Information: [full citation](#), [abstract](#)

This paper develops a fast method for solving linear SVMs with L_2 loss function that is suited for large scale data mining tasks such as text classification. This is done by modifying the finite Newton method of Mangasarian in several ways. Experiments indicate that the method is much faster than decomposition methods such as SVM^{light}, SMO and BSVM (e.g., 4-100 fold), especially when the number of examples is large. The paper also suggests ways of extending the metho ...

5 Robust feature induction for support vector machines



Rong Jin, Huan Liu

July 2004

Proceedings of the twenty-first international conference on Machine learning ICML '04

Publisher: ACM Press

Full text available: pdf(232.30 KB)

Additional Information: [full citation](#), [abstract](#), [references](#)

The goal of feature induction is to automatically create nonlinear combinations of existing features as additional input features to improve classification accuracy. Typically, nonlinear features are introduced into a support vector machine (SVM) through a nonlinear kernel function. One disadvantage of such an approach is that the feature space induced by a kernel function is usually of high dimension and therefore will substantially increase the chance of over-fitting the training data. Another ...

6 Sparse bayesian learning and the relevance vector machine

Michael E. Tipping

September 2001

The Journal of Machine Learning Research, Volume 1

Publisher: MIT Press

Full text available: pdf(999.88 KB)

Additional Information: [full citation](#), [abstract](#), [citations](#)

This paper introduces a general Bayesian framework for obtaining sparse solutions to regression and classification tasks utilising models linear in the parameters. Although this framework is fully general, we illustrate our approach with a particular specialisation that we denote the 'relevance vector machine' (RVM), a model of identical functional form to the popular and state-of-the-art 'support vector machine' (SVM). We demonstrate that by exploiting a probabilistic Bayesian learning framework ...

7 A fast iterative algorithm for fisher discriminant using heterogeneous kernels



Glenn Fung, Murat Dundar, Jinbo Bi, Bharat Rao

July 2004

Proceedings of the twenty-first international conference on Machine learning ICML '04

Publisher: ACM Press

Full text available: pdf(217.86 KB)

Additional Information: [full citation](#), [abstract](#), [references](#)

We propose a fast iterative classification algorithm for Kernel Fisher Discriminant (KFD) using heterogeneous kernel models. In contrast with the standard KFD that requires the user to predefine a kernel function, we incorporate the task of choosing an appropriate kernel into the optimization problem to be solved. The choice of kernel is defined as a linear combination of kernels belonging to a potentially large family of different positive semidefinite kernels. The complexity of our algorithm d ...

Keywords: Binary Classification, Heterogeneous Kernels, Linear Fisher Discriminant, Mathematical Programming

8 Machine learning in automated text categorization



Fabrizio Sebastiani

March 2002

ACM Computing Surveys (CSUR), Volume 34 Issue 1

Publisher: ACM Press

Full text available: pdf(524.41 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

The automated categorization (or classification) of texts into predefined categories has witnessed a booming interest in the last 10 years, due to the increased availability of documents in digital form and the ensuing need to organize them. In the research community the dominant approach to this problem is based on machine learning techniques: a general inductive process automatically builds a classifier by learning, from a set of preclassified documents, the characteristics of the categories. ...

Keywords: Machine learning, text categorization, text classification

9 Automatic generation of functional vectors using the extended finite state machine model



Kwang-Ting Cheng, A. S. Krishnakumar

January 1996 **ACM Transactions on Design Automation of Electronic Systems (TODAES)**, Volume 1 Issue 1

Publisher: ACM Press

Full text available: pdf(455.35 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

We present a method of automatic generation of functional vectors for sequential circuits. These vectors can be used for design verification, manufacturing testing, or power estimation. A high-level description of the circuit in VHDL or C is assumed available. Our method automatically transforms the high-level description of a circuit in VHDL or C into an extended finite state machine (EFSM) model that is used to generate functional vectors. The EFSM model is a generalization of the traditi ...

Keywords: automatic test generation, design verification, extended finite state machines, functional testing

10 TNPack—A truncated Newton minimization package for large-scale problems: I. Algorithm and usage



Tamar Schlick, Aaron Fogelson

March 1992 **ACM Transactions on Mathematical Software (TOMS)**, Volume 18 Issue 1

Publisher: ACM Press

Full text available: pdf(1.54 MB)

Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

Keywords: nonlinear optimization, preconditioned conjugate gradient, sparse matrices, truncated Newton methods

11 Algorithm 711: BTN: software for parallel unconstrained optimization



Stephen G. Nash, Ariela Sofer

December 1992 **ACM Transactions on Mathematical Software (TOMS)**, Volume 18 Issue 4

Publisher: ACM Press

Full text available: pdf(1.64 MB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

BTN is a collection of FORTRAN subroutines for solving unconstrained nonlinear optimization problems. It currently runs on both Intel hypercube computers (distributed memory) and Sequent computers (shared memory), and can take advantage of vector processors if they are available. The software can also be run on traditional computers to simulate the performance of a parallel computer. BTN is a general-purpose algorithm, capable of solving problems with a large numbers of variables and suitab ...

Keywords: conjugate gradient method, nonlinear optimization, parallel computing, truncated-Newton method

12 Industry/government track posters: Learning a complex metabolomic dataset using random forests and support vector machines



Young Truong, Xiaodong Lin, Chris Beecher

August 2004 **Proceedings of the tenth ACM SIGKDD international conference on Knowledge discovery and data mining KDD '04**

Publisher: ACM Press

Full text available: pdf(179.85 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Metabolomics is the "omics" science of biochemistry. The associated data include the quantitative measurements of all small molecule metabolites in a biological sample. These datasets provide a window into dynamic biochemical networks and conjointly with other "omic" data, genes and proteins, have great potential to unravel complex human diseases. The dataset used in this study has 63 individuals, normal and diseased, and the diseased are drug treated or not, so there are three classes. The goal ...

Keywords: metabolomics, missing data, random forest, support vector machines

13 Pac-bayesian generalisation error bounds for gaussian process classification

Matthias Seeger

March 2003 **The Journal of Machine Learning Research**, Volume 3

Publisher: MIT Press

Full text available:  pdf(487.11 KB)Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Approximate Bayesian Gaussian process (GP) classification techniques are powerful non-parametric learning methods, similar in appearance and performance to support vector machines. Based on simple probabilistic models, they render interpretable results and can be embedded in Bayesian frameworks for model selection, feature selection, etc. In this paper, by applying the PAC-Bayesian theorem of McAllester (1999a), we prove distribution-free generalisation error bounds for a wide range of approxima ...

Keywords: Bayesian learning, Gaussian processes, Gibbs classifier, Kernel machines, PAC-Bayesian framework, convex duality, generalisation error bounds, sparse approximations

14 Area and performance tradeoffs in floating-point divide and square-root implementations

Peter Soderquist, Miriam Leeser

September 1998 **ACM Computing Surveys (CSUR)**, Volume 28 Issue 3

Publisher: ACM Press

Full text available:  pdf(700.72 KB)Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Floating-point divide and square-root operations are essential to many scientific and engineering applications, and are required in all computer systems that support the IEEE floating-point standard. Yet many current microprocessors provide only weak support for these operations. The latency and throughput of division are typically far inferior to those of floating-point addition and multiplication, and square-root performance is often even lower. This article argues the case for high-perf ...

Keywords: FPU, SRT, area and performance tradeoffs, division, floating-point, square root

15 Technical reports

SIGACT News Staff

January 1980 **ACM SIGACT News**, Volume 12 Issue 1

Publisher: ACM Press

Full text available:  pdf(5.28 MB)Additional Information: [full citation](#)16 Pen computing: a technology overview and a vision

André Meyer

July 1995 **ACM SIGCHI Bulletin**, Volume 27 Issue 3

Publisher: ACM Press

Full text available:  pdf(5.14 MB)Additional Information: [full citation](#), [abstract](#), [citations](#), [index terms](#)


This work gives an overview of a new technology that is attracting growing interest in public as well as in the computer industry itself. The visible difference from other technologies is in the use of a pen or pencil as the primary means of interaction between a user and a machine, picking up the familiar pen and paper interface metaphor. From this follows a set of consequences that will be analyzed and put into context with other emerging technologies and visions. Starting with a short historic ...

17 C and tcc: a language and compiler for dynamic code generation

Massimiliano Poletto, Wilson C. Hsieh, Dawson R. Engler, M. Frans Kaashoek

March 1999 **ACM Transactions on Programming Languages and Systems (TOPLAS)**, Volume 21 Issue 2

Publisher: ACM Press

Full text available:  pdf(471.68 KB)Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

Dynamic code generation allows programmers to use run-time information in order to achieve performance and expressiveness superior to those of static code. The 'C(Tick C)

language is a superset of ANSI C that supports efficient and high-level use of dynamic code generation. 'C provides dynamic code generation at the level of C expressions and statements and supports the composition of dynamic code at run time. These features enable programmers to add dynamic code generation ...

Keywords: ANSI C, compilers, dynamic code generation, dynamic code optimization

18 Performance predictions for parallel diagonal-implicitly iterated Runge-Kutta methods



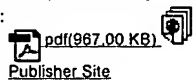
Thomas Rauber, Gudula Rünger

July 1995

ACM SIGSIM Simulation Digest , Proceedings of the ninth workshop on Parallel and distributed simulation, Volume 25 Issue 1

Publisher: IEEE Computer Society , ACM Press

Full text available:



Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

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Many simulations in the natural sciences and engineering require the numerical solution of nonlinear differential equations. For this class of numerical methods, we propose an appropriate parallel computation model on distributed memory machines that supports the prediction of execution times. As a case study, we investigate the parallel implementation of the diagonal-implicitly iterated Runge-Kutta method, a solution method for stiff systems of ordinary differential equations. An implement ...

Keywords: Intel iPSC/860, Runge-Kutta methods, digital simulation, distributed memory machines, nonlinear differential equations, parallel algorithms, parallel computation model, parallel diagonal-implicitly iterated Runge-Kutta methods, performance evaluation, prediction model, simulations

19 A coordination language for mixed task and and data parallel programs



Thomas Rauber, Gudula Rünger

February 1999

Proceedings of the 1999 ACM symposium on Applied computing

Publisher: ACM Press

Full text available: [pdf\(1.39 MB\)](#)

Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

Keywords: coordination language, message-passing programs, mixed task and data parallelism, parallel scientific computing

20 The connection machines CM-1 and CM-2: solving nonlinear network problems



S. A. Zenios, R. A. Lasken

June 1988

Proceedings of the 2nd international conference on Supercomputing

Publisher: ACM Press

Full text available: [pdf\(1.09 MB\)](#)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

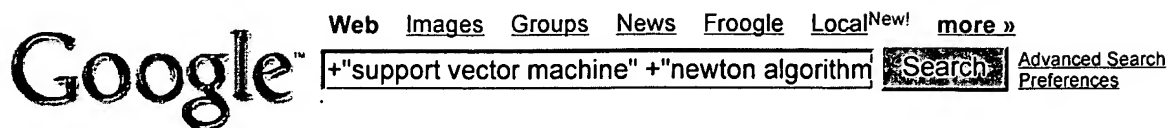
Massively parallel computers — like the Connection Machines CM-1 and CM-2 — have demonstrated remarkable performance in applications like pattern recognition, database searching, dense linear algebra computations and so on. In this paper we discuss the use of these systems for the solution of nonlinear network optimization problems that appear in operations research, transportation, engineering design, financial modeling and other areas. We describe the implementation ...

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IEEE CNF IEEE Conference Proceeding

IEE CNF IEE Conference Proceeding

IEEE STD IEEE Standard

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